

BOTANY.—*The genus Hilaria (Gramineae)*. ERNEST R. SOHNS, U. S. National Museum. (Communicated by Agnes Chase.)

(Received July 16, 1956)

Hilaria, named in honor of Auguste St. Hilaire, was described by Humboldt, Bonpland, and Kunth (1816) with one species (*H. cenchroides*) from Mexico. "Crescit in planitie montana regni Mexicana, inter Zelaya et Guanaxuato, locis subfrigidis, alt. 980 hexap. [Perennial] Floret Septembri."

According to the authors *Hilaria* resembled *Anthephora*, after which it was placed in taxonomic sequence. In the following 50 years at least three new generic names entered the literature, and all are considered synonyms of *Hilaria*. Among these is the genus *Pleuraphis*, established by Torrey (1824), with one species (*P. jamesii*) in honor of Dr. E. James. Some contemporary agronomists recognize this genus as distinct from *Hilaria*. Presl (1830) described the genus *Hexarrhena*, with a single species (*H. cenchroides*), which he placed in the tribe Saeccharinae, subtribe Hordeaceae. From his description and plate 45, there is no doubt that the species is *H. cenchroides* of Humboldt, Bonpland and Kunth. In 1866, Buckley described a new genus from Texas (*Schleropelta*) with one species *S. stolonifera*. The description applies to *H. belangeri* (*Anthephora belangeri* Steud.). By 1891, five species and two varieties of *Hilaria* had been described.

Taxonomists have differed in the assignment of the genus to tribes and subtribes. Steudel (1854) and Fournier (1886) put *Hilaria* in the tribe Phalarideae. Bentham (1881) divided the tribe Zoysieae into two subtribes (Anthephoreae and Euzoysieae) and placed the genus in the former. Bentham and Hooker (1883) and Hackel (1887) treated the genus as a member of the Zoysieae. Beal (1896), Bews (1929), Conzatti (1946), Hitchcock (1936) and Roshevits (1937) regarded this genus as belonging to the Zoysieae. Pilger (1954) placed *Hilaria* in the subfamily Eragrostoideae, subtribe Lappagineae Link. He also recognized *Pleuraphis* as a distinct genus.

I believe the genus is a very old and highly specialized one and that it does not belong

in the tribe Zoysieae. It has no close generic relationship with any known North or South American genus. Cytogenetic techniques may help indicate evolutionary tendencies within the genus. For the present it is better to keep the genus in the Zoysieae than to erect a new tribe or subtribe. The accumulation of cytogenetic data, together with detailed taxonomic, morphological and anatomical studies in our known genera will enable us, eventually, to assign the genus *Hilaria* to its proper tribe.

The species of *Hilaria* are vegetatively remarkably uniform for both subgenera of the genus. They are mostly low, stoloniferous or nonstoloniferous plants with pistillate central spikelets or tall, rhizomatous bunch grasses with perfect central spikelets. The nine species and one variety at present known are endemics restricted to the mountains, dry plains and plateaus of the southwestern United States, Mexico and Guatemala. One species, *H. belangeri*, has been reported from Venezuela (cultivated in experiment plots). The inflorescence is spicate and composed of two to many fascicles. Each fascicle contains three spikelets, one central and two lateral spikelets. The central spikelet is 1-flowered and perfect in *H. jamesii*, *H. mutica* and *H. rigida*. One-flowered, pistillate central spikelets are characteristic of the other species. The lateral spikelets, appearing somewhat pedicellate, are all staminate and may have from one to five florets. Any one, or all of the lateral florets, may be sterile. The glumes in those species with perfect central spikelets may be papyraceous and scarcely fused at the base, or, in those species with pistillate central spikelets, the glumes are rigid, indurated and fused at the base. The fascicle pattern is the same for all species of the genus. Diagrammatic sketches of various fascicle patterns are presented in fig. 1.

Brown (1950) and Brown and Coe (1951) have been the pioneers in cytogenetic investigations in this genus. *H. belangeri* (collection no. 3394) was reported to have a

chromosome number of 36, and *H. mutica* (collection no. 3279) a diploid number of 36 ($n = 18$). *H. belangeri* (Ozona Clone) has 36 chromosomes ($n = 9$), while *H. belangeri* (Eden no. 4 and Eden no. 6) has 72 chromosomes ($n = 9$). The phenomenon of ovule abortion in *H. belangeri*, *H. jamesii* and *H. mutica* is discussed also.

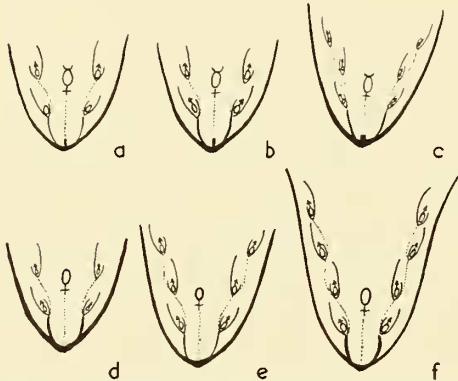


FIG. 1.—Fascicle diagrams in *Hilaria*: a-c, Fascicle types encountered in the subgenus *Pleurapheae*: central spikelets 1-flowered and perfect, lateral spikelets 2-3-flowered, all staminate or the lower sometimes sterile. d-f, fascicle types encountered in the subgenus *Eu-Hilarieae*: central spikelets 1-flowered and pistillate, lateral spikelets 1-5-flowered, all staminate or staminate and sterile intermixed. Only one glume of each lateral spikelet is represented.

The species of *Hilaria* are among the important forage grasses of the ranges in the southwestern United States and Mexico. The rapid spread of the stoloniferous species also makes them important soil binders. In the genus *Hilaria*, *H. belangeri* is probably the most important range species. *H. jamesii* and *H. mutica* are regarded as having medium grazing value and low to very low palatability. *Hilaria jamesii* is often the dominant grass in many parts of northern Arizona and New Mexico and in southern Colorado and Utah. When this species is young it is good forage for sheep. *H. mutica* is characteristic of level upland and desert valleys in which there are no really permanent streams, but these areas are occasionally overflowed during heavy storms. According to Goodding (mss.) the inflorescences are often infected with ergot. *Hilaria rigida* occupies the driest parts of

the desert areas, particularly the Mojave Desert. It is encountered on sand dunes and rocky slopes. This species forms isolated clumps and is therefore an excellent grass for controlling blowing sand. It is a highly prized grass in southern Nevada and in the region of Kingman, Arizona.

This paper is part of a continuing series contributing toward a revision of the Grasses of Mexico; therefore, only Mexican specimens are cited, except where the type was collected in the United States. All figures, unless otherwise indicated, were drawn by the author.

KEY TO SPECIES OF HILARIA

- A. Fascicles with thin, papyraceous glumes, these not conspicuously fused and indurated at the base; the central spikelet 1-flowered and perfect [subgenus *Pleurapheae*].
 - B. Culms felty-pubescent; glumes of the central spikelet narrow, plumose, deeply cleft into few to several acuminate, ciliate lobes and slender awns; glumes of the lateral spikelets thin, long-ciliate, 2-4-lobed at the summit
 - 3. *H. rigida*
 - BB. Culms not felty-pubescent.
 - C. Glumes of the lateral spikelets acute, usually with a single awn 1. *H. jamesii*
 - CC. Glumes of the lateral spikelets thin, broadened upwards, the tips finely lacinate 2. *H. mutica*
- AA. Fascicle with thickened asymmetric glumes, conspicuously fused and indurated at the base; the central spikelets 1-flowered and pistillate [subgenus *Eu-Hilarieae*].
 - D. Spikes pale and usually slender (if thick, then the glumes papillose-pilose between the nerves); sometimes violaceous from the accumulation of anthocyanin pigmentation; scabrous black glands may be present, but usually not abundant.
 - E. Plants stoloniferous, blades mostly basal.
 - F. Glumes scabrous; awns short, slightly divergent, thick, conspicuously ciliate on the margins, the cilia often retrorse
 - 6. *H. ciliata*
 - FF. Glumes variously textured; awns not ciliate on the margins.
 - G. Fascicles 5-6 mm long.
 - H. Glumes usually with one, rarely more, awns, margins conspicuously hyaline; plants wiry, densely tufted
 - 4. *H. belangeri*
 - HH. First glume of the central spikelet thick, terminating

in 2-5 awns, margins not hyaline; glumes of the central spikelet thick, terminating in 2-4 awns; plants not wiry or densely tufted

7. *H. hintonii*

GG. Fascicles 8-10 mm long; glumes conspicuously papillose-pilose between the nerves, the lemmas sparingly pilose on the back toward the tip

8. *H. semplei*

EE. Plants apparently non-stoloniferous; blades long, flat; ligule 2.5-3 mm long; spikes scarcely exceeding the blades

4a. *H. belangeri* var. *longifolia*

DD. Spikes mostly gray to black; coloration resulting either from numerous scabrous black glands or the accumulation of anthocyanin pigmentation, or both.

I. Spikes slender; fascicles 6.5-8 mm long; glumes narrow at the base, as long as the florets, dark gray to almost black, the margins hyaline and conspicuously lighter in color; lateral spikelets 2-flowered

9. *H. swallenii*

II. Spikes usually thick; fascicles 4-7.5 mm long; glumes broader at the base, shorter than the florets, the margins not conspicuously lighter in color nor hyaline; lateral spikelets 2-4-flowered (rarely 5-flowered)...

5. *H. cenchroides*

1. *Hilaria jamesii* (Torr.) Benth., Journ. Linn. Soc., Bot. 19: 62. 1881.

Pleuraphis jamesii Torr., Ann. Lye. New York 1: 148. pl. 10. 1824.

Perennial, tufted, rhizomatous; culms erect, 20-65 cm tall, nodes pubescent; sheaths glabrous or slightly scabrous, sparsely villous near the collar and behind the ligule; ligule 2-3 mm long, membranaceous, often lacinate; blades 2-20 cm long, 2-4 mm wide, involute when dry, scabrous on the lower surface, scabrous on the upper between the nerves; spike thick, 2-6 cm long, rachis joints up to 6 mm long, angular, finely pubescent; fascicles 6-8 mm long, long-villous at the base; lateral spikelets 3-flowered, staminate; stamens 3, anthers of the first floret about 5 mm long; lodicules 2, 0.1-0.2 mm long; central spikelet 1-flowered, perfect; lodicules 2, about 0.2 mm long.

Distribution: Arizona, California, Colorado, Nevada, Texas, Utah, and Wyoming.

2. *Hilaria mutica* (Buckl.) Benth., Journ. Linn. Soc., Bot. 19: 62. 1881.

Pleuraphis mutica Buckl., Proc. Acad. Nat. Sci. Philadelphia 1862: 95. 1862.

Perennial, tufted, rhizomatous; culms erect, 30-50 cm tall, nodes pubescent; sheaths striate, firm, scabrid, the lower overlapping the upper, shorter than the nodes, scabrous and sometimes sparsely papillose-pilose along the margins; ligule about 1 mm long, lacerate; blades up to 10 cm long, 2-4 mm wide, harshly short-scabrous on both surfaces, sometimes sparsely papillose-pilose on both surfaces; spike 4-8 cm long, joints of the spike slender, fascicles crowded; lateral spikelets 1 or 2-flowered (sometimes 3- or 4-flowered), staminate; lodicules 2, 0.1-0.2 mm long; glumes thin and broadened upward, the tips finely lacinate; central spikelet 1-flowered, perfect; lodicules 2, 0.1-0.2 mm long; glumes with one or more divergent awns from the back, the tips of the glumes lobed and finely lacinate.

Distribution: Arizona, Oklahoma, New Mexico, Texas, and northern Mexico.

MEXICO: CHIHUAHUA: 10 km E. of Jiménez, *Harvey* 1348; Rancho Carretas, Chihuahua-Sonora Border, *Harvey* 1534; Meoqui, *LeSeur* 040; south of Chihuahua, *LeSeur* 0132; plains near Chihuahua, *Pringle* 485; 19 mi. northwest of Naica, *Shreve* 8080; 31 miles northeast of Camargo, *Shreve* 8895; Sta. Eulalia Plains, *Wilkinson* 55. COAHUILA: Road to Don Martin Dam, *Harvey* 926; El Berrendo, near Múzquiz, *Harvey* 1175; 100 km west of Cuatro Ciénegas, *Harvey* 1254; *Johnson*, September 12, 1906; Múzquiz-Santa Anna, *Marsh* 497; Del Carmen Mountains, *Marsh* 853; Torreón, *Palmer* 506; ... between Hacienda La Rosa and Hacienda Lechuguilla, *Wynd and Mueller* 61; eastern slope of the Sierra de San Manuel, *Wynd and Mueller* 481. DURANGO: 3 miles northeast of Bermejillo, *Johnston* 7788; 49 miles north of Bermejillo, *Morley* 618; 3 miles Northeast of Bermejillo, *Shreve* 8816. SONORA: 3 miles east of Agua Prieta, *Santos* 1751; 5 miles north of Fronteras, *Santos* 1775.

3. *Hilaria rigida* (Thurb.) Benth., ex Scribn., Bull. Torrey Bot. Club 9: 86. 1882.

Pleuraphis rigida Thurber, in S. Wats., Bot. California 2: 293. 180.

Perennial; culms decumbent or rhizomatous



FIGS. 2-11.—*Hilaria mutica*: 2, Inflorescence and base of plant, $\times 1$ (drawn by M. W. Gill from Toumey specimen); 3, spikelet (Wright 760-2108, type); 4, floret of central spikelet, ovary and stamen (Le Seur 0132). *Hilaria rigida*: 5, Inflorescence and vegetative portion of plant, $\times 1$ (drawn by M. W. Gill from Palmer (no. 494) specimen); 6, glume of central spikelet (Cooper 2230, type); 7, floret of central spikelet and essential organs (Cooper 2230, type); 8, florets of lateral spikelets (Keck 4232). *Hilaria belangeri*: 9, fascicle; 10, central spikelet and floret (both drawn by A. Chase from Hitchcock specimen); 11, florets of lateral spikelet and one stamen (Nealley 600). All figures, unless otherwise indicated, $\times 8$.

at base, up to 2.5 m tall, woody felty-pubescent, upper nodes often pubescent; sheaths overlapping, glabrous or scabrous, a woolly line across the back at the collar; ligule about 1 mm long, woolly; blades 2-5 cm long or longer, 2-4 mm wide, slightly involute, glabrous or scabrous on the nerves on both surfaces, lower sheaths and blades sometimes tomentose-pubescent; spike 4-7 cm long, fascicles 6-12 mm long, densely bearded at the base; lateral spikelets 2 to 4-flowered, staminate (if 3 or 4-flowered, uppermost usually sterile); lodicules 2, 0.1-0.2 mm long; glumes of the lateral spikelets thin, long-ciliate, about 7-nerved, usually 2-4-lobed at the broad summit and with 1-3 nerves excurrent into slender awns, nerves sometimes obscure and scarcely excurrent (variable in the same inflorescence); central spikelet 1-flowered, perfect, distinctly pedicellate, equaling or exceeding the lateral spikelets, its narrow glumes deeply cleft into few to several acuminate ciliate lobes and slender awns; lemma often exceeding the glumes, thin, ciliate, 2-lobed, the midnerve excurrent as a short awn; stamens 3, anthers 4-4.5 mm long; stigmas 2, plumose, terminally exerted; lodicules 2, 0.1 mm long.

According to Watson (1880) this species was eaten avidly by pack animals.

Distribution: Arizona, California, Nevada, Utah, Lower California, and Sonora.

UNITED STATES: CALIFORNIA: Fort Mojave, *Cooper* 2230 (Type).

MEXICO: BAJA CALIFORNIA: Canon Cantillas, *Orcutt* 1145. CHIHUAHUA: Colonia Diaz, *Mearns* 406. SONORA: 50 miles south of Sonoyta on road to San Luis, *Keck* 4232.

4. *Hilaria belangeri* (Steud.) Nash, N. Amer. Fl. 17: 135. 1912.
Anthephora belangeri Steud., Syn. Pl. Glum. 1: 111. 1854.

Perennial, tufted, stoloniferous; culms 10 to 30 cm tall, erect, nodes villous; sheaths striate, glabrous, overlapping, upper sheaths shorter than the internodes; ligule 1.5 mm long, membranaceous; blades 3 to 10 cm long, flat or involute when dry, sparsely papillose-pilose on the margins and on the upper surface, tip involute; spike 2-4 cm long, fascicles 5-6 mm long; glumes firm, united below, scabrous, usually pale or sometimes violaceous, but not dark gray or black from glandular spots, rounded or pointed upwards,

terminating in one or more antrorsely scabrous awns as long as or longer than the fascicle; lateral spikelets 2-flowered (rarely 3-flowered), staminate or sometimes one floret neuter; stamens 3, anthers of the lower floret 3-3.5 mm long; anthers of the upper floret 3.2-3.7 mm long; central spikelet 1-flowered, pistillate, as long or longer than the lateral spikelet.

Distribution: Arizona, California, New Mexico, Texas, and Mexico.

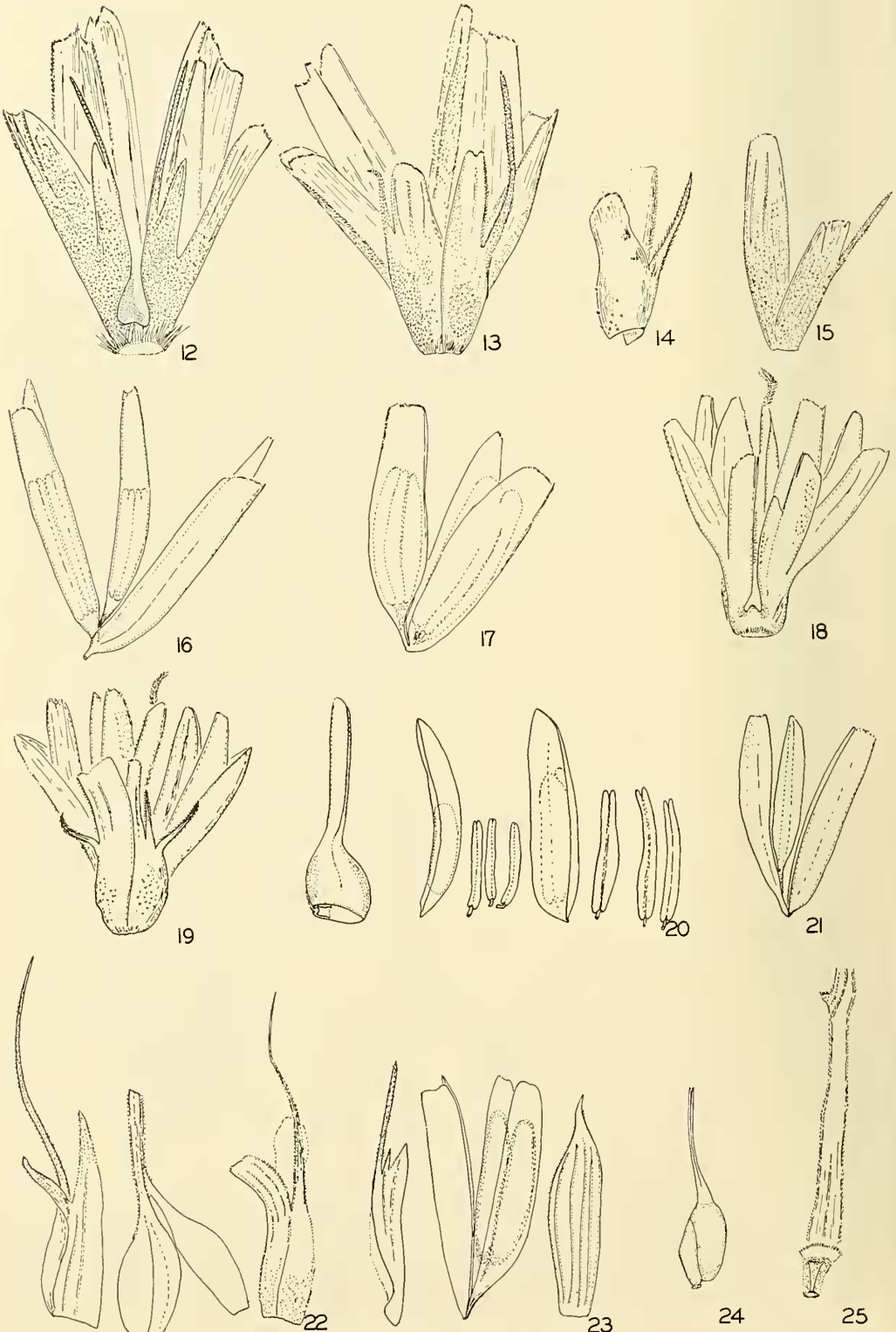
MEXICO: AGUASCALIENTES: Aguascalientes, *Hitchcock* 7477. BAJA CALIFORNIA: La Champaigna, Sierra de las Palmas, *Gentry* and *Fox* 11787. CHIHUAHUA: Rancho Carretos, *Harvey* 1621. GUERRERO: Coyuca, *Hinton* 6707. MICHOACÁN: Apatzingan, *Leavenworth* 1521. MÉXICO: Temascaltepec, *Hinton* 4733. MORELOS: Lava fields near Yautepec, *Pringle* 11225; between Xoxocotla and Alpuyec, *Sharp* 441358. SONORA: near Imuris, *Pennell* 20278; Hacienda de San Rafael, *Santos* 1782; 20 miles west of La Angostura, *Santos* 1802; Colonia Morelos, *Santos* 2032 [Sept. 15-Oct. 4, 1941]. TAMAULIPAS: Chamal, *Swallen* 1680, 1698.

- 4a. *Hilaria belangeri* var. *longifolia* (Vasey) Hitchc., Proc. Biol. Soc. Washington 41: 162. 1928.
Hilaria cenchroides var. *longifolia* Vasey, Proc. Amer. Acad. Sci. 24: 80. 1889; Beal, Grasses North America 2: 69. 1896.

Perennial, tufted, apparently non-stoloniferous; culms erect, 30 cm or more tall, nodes villous; sheaths striate, scabrous, basal sheaths overlapping, upper sheaths shorter than the internodes; ligule 2.5-3 mm long, membranaceous; blades 3-15 cm long, up to 3.5 mm wide, flat, scabrous on both surfaces, sparsely papillose-pilose on the margins and upper surface, tip involute; spike 2-4 cm long, joints of the axis 3-5 mm long, flat, margins antrorsely short-pilose; fascicles 5-8 mm long, 5-12 per inflorescence; first glume of lateral spikelet with one long awn, the others half as long, free or fused; lateral spikelets 2-flowered, lower floret usually neuter, upper floret staminate; stamens 3, anthers about 3 mm long; central spikelet 1-flowered, pistillate.

Distribution: Arizona, Texas, and northwestern Mexico.

MEXICO: SONORA: Guaymas, *Palmer* 347 (type); Guaymas, *Hitchcock* 3558; Colonia Morelos, *Santos* 2032 [15 Sept. 1947].



FIGS. 12-25.—(See opposite page for legend).

5. *Hilaria cenchroides* H. B. K., Nov. Gen. & Sp. 1: 117. pt. 37. 1816.

Perennial, tufted, stoloniferous; culms erect, 5-60 cm tall, nodes pilose; sheaths striate, overlapping, margins hyaline, the lower from sparsely to densely papillose-pilose, the upper glabrous and shorter than the internodes; ligule 1.5-2 mm long, lacinate; blades up to 10 cm long, to 4 mm wide, flat, involute on drying, slightly scabrous on the lower surface, very scabrous on the upper surface, sometimes also sparsely papillose-pilose, margins antrorsely scabrous; spikes 2-6 cm long, dark brown to purple in color; rachis joints scabrous-pubescent on the margins; fascicles 4-7.5 mm long; glumes usually shorter than the spikes, indurated and fused at the base; lateral spikelets 2-4-flowered (rarely 5 florets), staminate or some of them sterile; stamens 3, anthers 3-3.5 mm long, yellow; central spikelet 1-flowered, pistillate.

Distribution: Mexico to Guatemala.

MEXICO: BAJA CALIFORNIA: 19 miles north-east of Comondú, *Shreve* 7120. DISTRITO FEDERAL: Mixcoac, *Arsène* 8281; Camino de Toluca, *Balls* 5587; Mexico City, *Fisher* 70; San Ángel, *Fisher* 113; Xochimilco, *Hitchcock* 5889; Pedregal, *Hitchcock* 5950; Olivar, *Orcutt* 3591. DURANGO: Durango, *Hitchcock* 7580; *Palmer* 379, 541. GUANAJUATO: The Alameda, *Dugis*, July 1899; Acámbaro, *Hitchcock* 6939; Irapuato, *Hitchcock* 7430; 6 kms east of Guanajuato, *Sohns* 318. GUERRERO: Santa Fé, *Hitchcock* 6687. HIDALGO: Jacala, V. II. *Chase* 7110, 7230; Pachuca, *Hitchcock* 6718 ½; Guadalupe, *Juzepczuk* 114; Puerto de la Zorra, *Moore* and *Wood* 3776. JALISCO: La Punta, *Hitchcock* 7000; San Nicolás, *Hitchcock* 7188; Guadalajara, *Hitchcock* 7268; Río Blanco, *Palmer* 197; Huejuquilla, *Rose* 2542; La Punta, *Shreve* 9289. MÉXICO: Toluca, *Hitchcock* 6905; Molino de la Flor, *Matuda* 18932; Zumpango, *Matuda* 19723; San Gerónimo, *Matuda* 29247; Atizapan, *St. Pierre* 205; Tlalpan, *St. Pierre* 818; Mixcoac, *St. Pierre* 833, 881; San Ángel, *St. Pierre* 851; San Juan de Teotihuacan, *Santos* 2197; San Andreas, *Sohns* 190. MI-

CHOACÁN: Morelia, *Arsène* 5587; Zitácuaro, *Hinton* 13113. MORELOS: Cuernavaca, *Hitchcock* 6861; *Ross*, June 1953. OAXACA: Cerro del Fortín, *Conzatti* 3588; Oaxaca, *Hitchcock* 6096; Valle de Oaxaca, *Liebmann* 571; Tehuantepec, *Matuda* 311; Valle de Oaxaca, *Nelson* 1576; Valley of Cuicatlan, *Nelson* 1906; El Cerro de San Felipe del Agua, *Santos* 3208. PUEBLA: Fort de Loreto, *Arsène* 35; vicinity of Puebla, *Arsène* 284, 1019; Atlixco, *Nelson* 25/7/1893; San Francisco, *Nicolas* 15/8/1909; Cholula, *Nicolas* 14/7/1909. QUERÉTARO: Querétaro, *Arsène* 10274, Querétaro, *Hitchcock* 5865, 5870; *Semple*, November 1955. SAN LUIS POTOSÍ: Cardenas, *Hitchcock* 5713; Alvarez, *Palmer* 165. TAMAULIPAS: Buena Vista Hacienda, *Wootton* 21/6/1919. TLAXCALA: San Cristóbal to Calpulalpan, *Sohns* 573. VERACRUZ: Santa Ana Chiautempan, *Arsène* 11/10/1908; Orizaba, *Hitchcock* 6353; *Mohr*; *Mueller* 2079; *Schaffner* 199. ZACATECAS: Zacatecas, *Hitchcock* 7537.

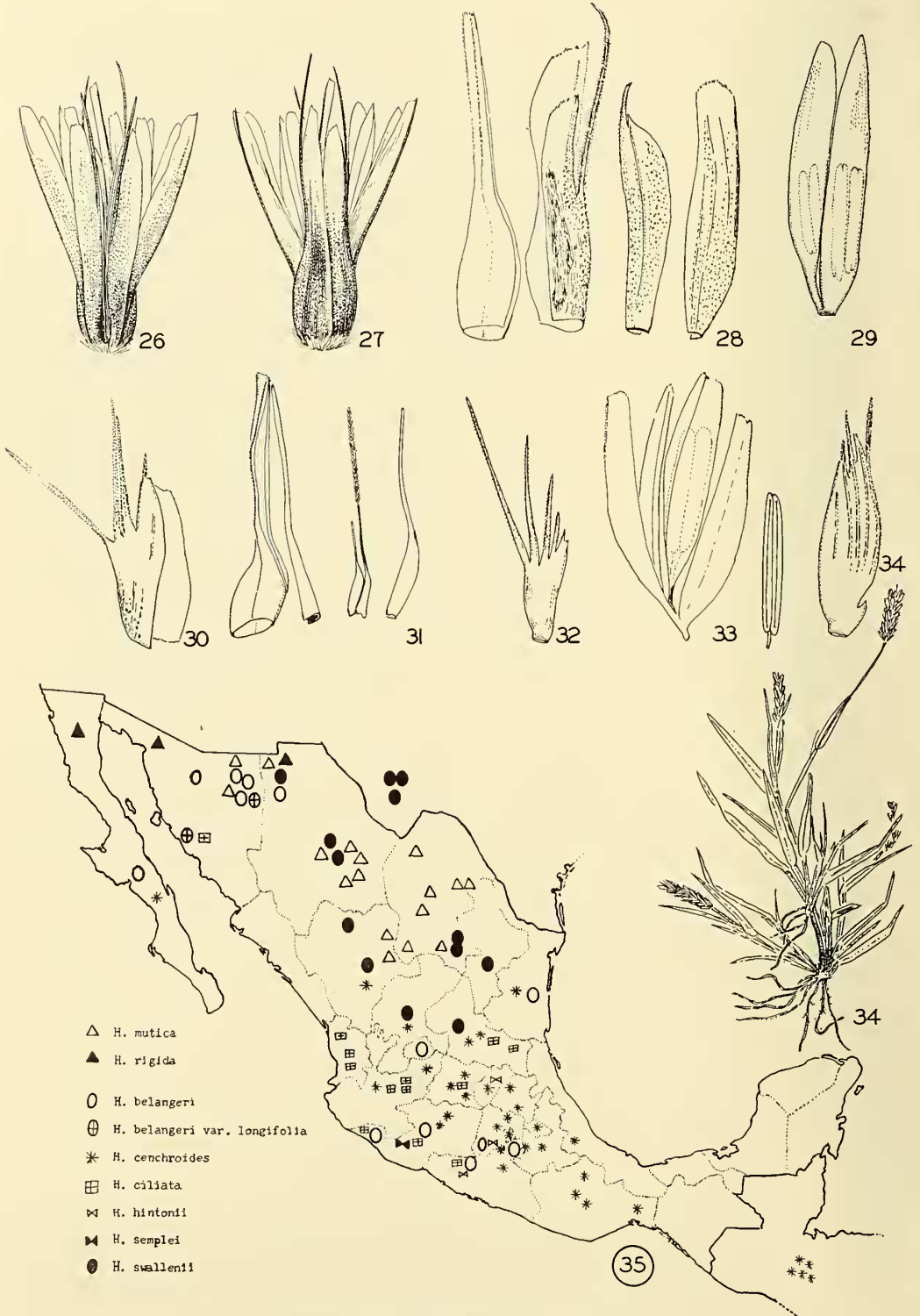
GUATEMALA: Guatemala City, *Hitchcock* 9084; *de Koninck* 142; *Popenoe* 667; La Aurora, *Morales R.* 726.

6. *Hilaria ciliata* (Scribn.) Sohns, comb. nov.

Hilaria cenchroides var. *ciliata* Scribn., Proc. Acad. Nat. Sci. Philadelphia 1891: 293.

Perennial, tufted, sometimes stoloniferous; culms up to 45 cm tall, erect, sometimes finely pubescent below the lower nodes, otherwise glabrous; nodes pilose; sheaths striate, glabrous, the lower sometimes sparsely papillose-pilose, usually shorter than the internodes; ligule about 2.5 mm long, membranaceous; blades 1.5-15 cm long, up to 4 mm wide, scabrous on both surfaces and margins, occasionally sparsely papillose-pilose on both surfaces, sparsely papillose-pilose at the collar and behind the ligule; spike 3-5 cm long, joints of axis 2.5-3.5 mm long, finely ciliate on the margins, sometimes sparsely pilose; fascicles mostly less than 4 mm long (rarely to 5 mm); glumes fused at base, papillate-scabrous; the awns of the glumes of the central spikelets 1 or 2, these usually not exceeding the lobes,

FIGS. 12-25.—*Hilaria cenchroides*: 12, Abaxial view of fascicle; 13, adaxial view of fascicle (both drawn from Galeotti 5689); 14, glume of central spikelet (*Hinton* 13113); 15, first and second glumes of lateral spikelet (*Hinton* 13113); 16, three florets from lateral spikelet (*Hinton* 13113); 17, two florets from lateral spikelet (*Palmer* 379). *Hilaria ciliata*: 18, Abaxial view of fascicle; 19, adaxial view of fascicle; 20, floret of central spikelet and first and second florets of lateral spikelets with stamens (all from Pringle 3128). *Hilaria betangeri* var. *tonjifolia*: 21, three florets of a lateral spikelet; 22, central spikelet; 23, lateral spikelet; 24, caryopsis; 25, rachis joint. All from *Palmer* 347. All figures $\times 8$.



FIGS. 26-35.—(See opposite page for legend).

sometimes reflexed at maturity, short-ciliate on the margins, the cilia often retrorse; awns of the lateral spikelets inconspicuous; lateral spikelets 2-flowered, staminate; stamens 3, anthers of the upper floret 2.8–3 mm long; central spikelet 1-flowered, pistillate.

Distribution: Known only from Mexico.

MEXICO: COLIMA: Alzada, *Hitchcock* 7077; Armeria, *Hitchcock* 7022; Manzanillo, *Hitchcock* 833; *Palmer* 197, 1267. GUERRERO: Mina, *Hinton* 9310. JALISCO: Zapotlán, *Hitchcock* 7125; Guadaluajara, *Hitchcock* 7370; Valley of the Río Grande de Santiago at Atequiza, *Palmer* 3128 (Type). MICHOACÁN: Aguquilla, *Hinton* 12093, 15213; Apatzingan, *Hinton* 12029; *Leavenworth* 1521, 1590; near Nueva Italia, *Sohns* 847. NAYARIT: Vicinity of Jalisco, *Ferris* 5818; Tepic, *Palmer* 1918; Acaponeta, *Rose, Standley and Russell* 14304. SAN LUIS POTOSÍ: Valley of the Río Tampaon, *V. H. Chase* 7530; Cardenas, *Hitchcock* 5774. SONORA: *Palmer*, s. n.

7. *Hilaria hintonii* Sohns, sp. nov.

Gramen perenne, stoloniferum; culmi 5–20 cm alti, nodi pubescenti; vaginae glabrae vel leviter pilosae; ligula 0.5–1 mm longa, membranacea; laminae 2–6 cm longae, usque ad 4 mm latae, planae, supra papilloso-pilosae, subtus glabrae vel interdum leviter papilloso-pilosae, margines scabrae; spicae 2–4 longae, articuli rachi plani, 1–4.5 mm longi; fasciculi 4–6.5 mm longi, glumae induratae, scaberulae; spiculae laterales bi- vel triflores, masculae; spicula intermedia uniflora, feminea.

Perennial, tufted, stoloniferous; culms 5–20 cm tall, erect; nodes pubescent; sheaths glabrous or sparingly pilose near the collar; ligule 0.5–1 mm long, membranaceous; blades 2–6 cm long, up to 4 mm wide, flat, thin, papillose-pilose on the upper surface, scabrous on the lower or sometimes sparsely papillose-pilose, margins scabrous, the tip acuminate; spikes 2–4 cm long, joints of the axis flat, 1–4.5 mm long, margins short ciliate; fascicles 4–6.5 mm long, the glumes indurated and fused at the base, scaberulous to sparsely glandular-spotted; first glumes of the lateral

spikelets indurated at the base, the tips terminating in 3 or 4 awns, one of which is as long as the spikelets; second glumes of the lateral spikelets broad, indurated, terminating in 2 to 4 awns of approximately equal length; lateral spikelets 2–3-flowered, staminate, or the lower sometimes sterile, stamens 3, anthers 2.8–3 mm long; glumes of the central spikelet with more or less truncated tips and 2 or 3 prominent awns; central spikelet 1-flowered, pistillate.

This species is named in honor of the late Mr. G. B. Hinton, exceptional collector of Mexican grasses.

TYPE: Temascaltepec, Mexico; Luvianos, llano, 9/8/1933; *Hinton* 4502 (U.S.N.H. no. 1840874).

Distribution: Central Mexico.

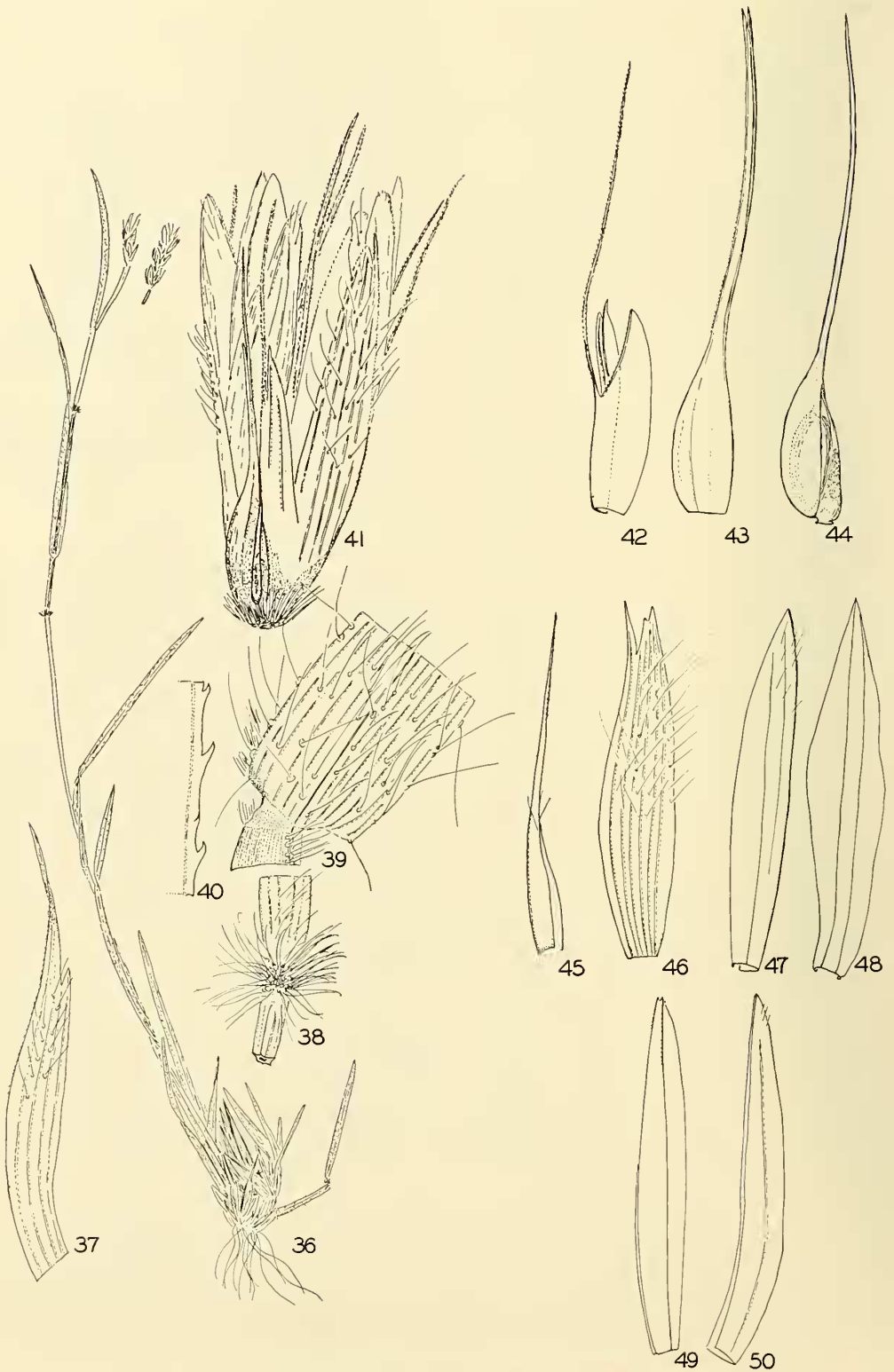
MEXICO: GUERRERO: Coyuca, *Hinton* 6437. MÉXICO: Temascaltepec, *Hinton* 4502. QUERÉTARO: South of San Juan del Río, *Semple*, November 1955.

8. *Hilaria semplei* Sohns, sp. nov.

Gramen perenne, stoloniferum; culmi erecti, 20–35 cm alti, glabri; nodi papilloso-pilosi; vaginae striatae, internodiis breviores, inferiores papilloso-pilosae, superiores glabrae; ligula membranacea, 0.5–1 mm longa; laminae 2.5–15 cm longae, usque ad 2.5 mm latae, plana vel V-forma, utrinque papilloso-pilosae, margines scabrae; spicae 2–4 cm longae, articuli rachi 2.5–4.5 mm longi, plani, margines ciliati; fasciculi 8–10 mm longi; glumae induratae, valde nervosae, internerviis papilloso-pilosae, aristae scabrae; spiculae laterales biflores, masculae; lemmata membranacea, summa tenuiter pilosi, leviter 3 vel 4-nerviis; spicula intermedia uniflora, feminea; lemma membranaceum, leviter 3-nerviis, 8–10 mm longum.

Perennial, tufted, stoloniferous; culms 20–35 cm tall, erect, glabrous; nodes papillose-pilose; sheaths striate, shorter than the internodes, the lower papillose-pilose, the upper glabrous; ligule 0.5–1 mm long, membranaceous; blades 2.5–15 cm long, up to 2.5 mm wide, slightly V-shaped in cross-section or flat, papillose-pilose on both surfaces, margins antrorsely scabrous, the tip

FIGS. 26–35.—*Hilaria swallenii*: 26, Abaxial view of fascicle; 27, adaxial view of fascicle (drawn by A. Chase from Young (No. 46) specimen); 28, lemma, glume of central spikelet, first and second glumes of lateral spikelet; 29, two florets of a lateral spikelet (both from Sperry T778). *Hilaria hintonii*: 30, glume of central spikelet; 31, two pistillate florets from central spikelet; 32, first glume of lateral spikelet; 33, three florets and a stamen from a lateral spikelet; 34, second glume of lateral spikelet and habit sketch of plant ($\times 1\frac{1}{2}$). All drawn from *Hinton* 4502. All figures $\times 8$. 35: Map of Mexico showing distribution of species of *Hilaria*.



Figs. 36-50.—(See opposite page for legend).

involute; spike 2-4 cm long, joints of the axis 2.5-4.5 mm long, flat, the margins finely ciliate, rachis flaps prominent, tips finely ciliate; fascicles 8-10 mm long; glumes fused at base, strongly nerved, papillose-pilose between the nerves, awns prominent, antrorsely scabrous; lateral spikelets 2-flowered, the florets staminate, lemmas membranaceous, faintly 3- or 4-nerved, the tips sparingly pilose, paleas membranaceous, as long as the lemmas, 2-nerved; central spikelet 1-flowered, pistillate; lemma membranaceous, faintly 3-nerved, 8-10 mm long.

This species is named in honor of Dr. A. T. Semple, Food and Agricultural Organization of the United Nations.

TYPE: Dense heavy stands on very heavy clay soil; dominant grass over many areas; Llanos de Antuñez, about 12 miles east of Apatzingan, Michoacán, alt. 1,000 feet; November 1955, A. T. Semple (U.S.N.H. no. 2183565). Dry grasslands between Nueva Italia and Apatzingan, alt. 430 m., dominant grass; November 14, 1955; Moore, Hernández X. and Porras H. 5753.

9. *Hilaria swallenii* Cory, *Wrightia* 1: 215. 1948.

Perennial, tufted, stoloniferous; culms erect, 10 to 30 cm tall, nodes villous; sheaths shorter than the internodes, slightly scabrous; ligule 2-2.2 mm long, membranaceous; blades mostly short, basal, up to 8 cm long, 1-2 mm wide, flat or involute when dry, scabrous on both surfaces; spike 1-4 cm long, gray to dark-brown in color, sparsely to densely provided with glands; rachis joints 4-6 mm long, sparsely short-scabrous on the margins and over the back; fascicles 6.5-8 mm long, 2 to 8 per spike, narrow, appressed, not conspicuously flabellate at maturity; glumes connate at base, margins usually hyaline and light gray to whitish; lateral spikelets 2-flowered, the lower floret usually sterile, the upper staminate, stamens 3, anthers 3-3.5 mm long; central spikelet 1-flowered, pistillate, the base of the lemma usually elliptic.

Distribution: Davis Mountains area of Texas and Mexico.

UNITED STATES: TEXAS: Músquiz Canyon, Sperry T778 (Type).

MEXICO: CHIHUAHUA: 19 km North of Río San Pedro on Parral-Chihuahua Road, Harvey 1432; 2 km west of Carretas, Harvey 1568; near Chihuahua, Pringle 493. COAHUILA: 3 miles southeast of Saltillo, Johnston 7251; 2 miles southeast of Saltillo, Shreve 8509. DURANGO: 5½ miles south of Ignacio Allende, Gentry 6915; near Torreón de las Canas, Gentry 8639. NUEVO LEÓN: Galena, V. H. Chase 7763. SAN LUIS POTOSÍ: Charcas, Lundell 5515; Charcas, Whiting 508, 528. ZACATECAS: Among cerros 6 miles southeast of Carboneras, Gentry 8504.

LITERATURE CITED

- BEAL, W. J. *Grasses of North America* 2: 65. 1896.
 BENTHAM, G. *Notes on Gramineae*. Journ. Linn. Soc. Bot. 19: 61-63. 1881.
 BENTHAM, G., and HOOKER, J. D. *Genera plantarum* 3: 1121. 1883.
 BEWS, J. W. *The world's grasses*: 69, 121, 214. London, 1929.
 BROWN, W. V. *A cytological study of some Texas Gramineae*. Bull. Torrey Bot. Club 77: 63-76. 1950.
 BROWN, W. V. and COE, G. E. *A study of sterility in Hilaria belangeri (Steud.) Nash and Hilaria mutiea (Buekl.) Benth.* Amer. Journ. Bot. 38: 823-830. 1951.
 BUCKLEY, S. B. *Description of new Texas grasses—Schleropelta n. genus*. Prel. Rep. Geol. & Agr. Surv. Texas. App. 1: 1. 1866.
 CONZATTI, C. *Flora taxonomica Mexicana* 1: 172, 176-177. 1946.
 FOURNIER, E. *Mexicanas plantas. Pars secunda*: 70, 72-73. Paris, 1886.
 HACKEL, E. *Gramineae (echte Gräser)*. Die natürlichen Pflanzenfamilien 2: 30. 1887.
 HITCHCOCK, A. S. *The genera of the grasses of the United States*. U. S. Dept. Agr. Techn. Bull. 772: 172-174. 1936.
 HUMBOLDT, A., BONPLAND, A., and KUNTH, C. S. *Nova genera et species plantarum* 1: 116-118. pl. 37. 1815.
 PILGER, R. *Das System der Gramineae*. Bot. Jahrb. 76: 348. 1954.
 PRESL, J. S. *Reliquiae Haenkeanae* 1: 326. pl. 45. Prague, 1830.
 ROSHEVITS, R. YU. *Grasses*: 168, 522, 530. Moscow, 1937.
 STEUDEL, E. G. *Synopsis plantarum glumacearum*, pt. 1: 12. 1854.
 TORREY, JOHN. *Description of some new grasses collected by Dr. E. James, in the expedition of Major Long to the Rocky Mountains, in 1819-1820*. Ann. Lyc. New York 1: 148-150. pl. 10. 1824.

FIGS. 36-50.—*Hilaria semplei* Sohns, sp. nov.: 36, Habit sketch of plant, $\times 1\frac{1}{2}$; 37, basal sheath and blade; 38, node; 39, junction of blade and sheath; 40, margin of blade; 41, fascicle; 42, glume of central spikelet; 43, floret of central spikelet; 44, palea and earyopsis; 45-46, first and second glumes of lateral spikelets; 47-48, lemma and palea of first floret; 49-50, palea and lemma of second floret. All figures $\times 8$ and drawn from the type specimen.